

METHOD AND EQUIPMENT FOR PRE-TREATMENT OF USED TYRES BEFORE A PYROLYSIS PROCESS

The present invention concerns a method and an equipment for
5 pre-treatment of used tyres before a pyrolysis process.

In previously known pyrolysis processes tyres have been
washed by water, which will require increased heating energy
to remove all water from the tyres. Further such water
10 washing result in considerable waste water problems due to
the enormous amount of water required.

According to previous pyrolysis techniques the tyres have
been mechanically torn to pieces before they have been
15 brought to the pyrolysis process, which will require enormous
mechanical energy resulting in high maintenance costs.

The object of the present invention is to eliminate the above
problems, which is achieved with a method according to which
20 each tyre is cleaned in a cleaning station with high pressure
air jets before it is fed to a first heating stage of the
pyrolysis process. The equipment according to the present
invention comprises a cleaning chamber provided with a number
of air nozzles for cleaning each tyre with high pressure air
25 jets. Because no water is used there will be no waste water
problem and no excess water have to be removed from the tyres
during the first heating stage.

Preferably cleaning of each tyre is carried out in a closed
30 chamber, whereby air contaminated with dust and other dirt
particles from the tyre is continuously conducted through an
air cleaning device for removing said dust and other dirt
particles from the air, and received cleaned air is fed to a

high pressure blower for producing said high pressure air jets.

Cleaning of said air is preferably carried out by means of a
 5 high voltage electric field between a central charging
 electrode provided with radially directed tips having a first
 polarity and a cylindrical collecting electrode of opposed
 electric polarity, surrounding said charging electrode, when
 10 contaminated air is fed through said electric field. By means
 of such air cleaning no contaminated air will get into the
 environment from the cleaning process.

According to one embodiment of the invention, the cleaned
 tyres are fed as whole tyres into said first heating stage or
 15 chamber. Hereby no extra energy is required to mechanically
 torn the tyres to pieces or otherwise disintegrate the tyres
 before entering the first heating stage, which mechanical
 treatment will require enormous energy and economical
 recourses due to high operation and maintenance costs. A
 20 further considerable advantage by feeding whole non-disinte-
 grated tyres into the pyrolysis process is that metal cords
 from said tyres will be received as flat metal plates at the
 bottom of a wagon or cage into which said tyres have been
 charged when fed into the pyrolysis process.

25 In order to be able to charge more tyres at the same time
 into the pyrolysis process the cleaned tyre can preferably be
 compressed to a block of reduced size before it is fed to
 said first heating stage.

30 Said compression is preferably carried out in a compression
 station between said cleaning chamber and said first heating
 chamber. Said compression station is preferably provided with

hydraulically operated compressing means for compressing each tyre to a block of reduced size. A cleaned tyre is intended to be rolled into the compression station along a narrow path ending at a vertical stop plate, whereby said compressing

5 means comprise a vertical and a horizontal hydraulic cylinder piston device being operated to compress a tyre fed into said station against said vertical stop plate and path bottom, respectively.

The invention will now be described in more detail with
10 reference to the enclosed drawing, wherein

Fig. 1 shows schematically a flow scheme of a preferred pre-treatment equipment according to the present invention,

15 Fig. 2 shows schematically a side view of a cleaning station according to the invention, and

Fig. 3a to 3c show different stages of compression of a tyre before entering a first heating stage.

20 A tyre 1 to be fed to a pyrolysis process is according to a preferred embodiment of the present invention first cleaned with high pressure air jets in a cleaning station 2. The cleaned tyre is then fed to a compression station 3 to be
25 compressed to a block of reduced size and said block is fed further to a first heating stage 4 of the pyrolysis process.

The cleaning station 2 comprises a chamber 5 which can be closed. Said chamber 5 is provided with air nozzles 6, 7
30 which during a cleaning process are directed to the outer and the inner surfaces of each tyre 1 transported through said cleaning chamber 5, which tyres are rotated around their own axis during said cleaning process. Said nozzles 6, 7 receive

high pressure air from a high pressure blower 8. In order to clean air contaminated with dust and other dirt particles from the tyre 1, the cleaning station is provided with an air cleaning circuit 9 including an air cleaning device 10 and said high pressure blower 8.

The air cleaning device 10 comprises a central charging electrode 11 provided with radially directed tips and a cylindrical collecting electrode 12 surrounding said charging electrode 11. A high voltage electric field is provided between said electrodes 11, 12 by connecting them to opposite poles of a high voltage current source 13. Due to corona phenomena at the tips of said charging electrode 11 ion jets will flow from the said tips towards said collecting electrode 12 charging all particles in the contaminated air stream and forcing the to adhere to the inner surface of said collecting electrode 12. said particles are intermittently removed from said surface and transported by means of a block feeder 14 and a conveyor 15 to a container 16 below said air cleaning device 10. The cleaned air is conveyed from the air cleaning device 10 along the circuit 9 to the high pressure blower 8 as mentioned above. Thus the air will continuously be circulated and reused in the cleaning chamber 5. By means of a control valve 17 a part of the clean high pressure air from the blower 8 can be led out into the atmosphere.

According to the disclosed preferred embodiment the cleaned tyre 1 is fed to a compression station 3 provided with hydraulically operated cylinder piston devices 19, 20. The tyre 1 is rolled along a narrow path 21 into said compression station 3 into contact against a vertical stop plate 18, whereby a vertical cylinder piston device 20, positioned above said tyre 1 is activated and will compress the tyre 1

downwards against path bottom, as schematically indicated in Fig. 3b, whereby a flat oblong rubber block 1a is received. Then a horizontal cylinder piston device 19 is activated and will compress the flat oblong rubber block against said stop plate 18, whereby a substantially cubic shaped rubber block 1b of further reduced size is received, as indicated in Fig. 3c. By compressing the tyres in this way before entering the first heating stage 4 the risk of possible air pockets within the tyres is considerably decreased.